

Running head: Flower box fires

Building fires as a result of smoking materials disposed into flower boxes

Strategies for Community Risk Reduction

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### CERTIFICATION STATEMENT

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

Signed: \_\_\_\_\_

### Abstract

Smokers are moving outdoors and as a result they are disposing of their smoking materials into containers readily available near the outside of the building. In some cases the container is a flower box full of potting soil, which has resulted in some building fires. The purpose of this research was to ascertain the magnitude of the problem and to reduce or eliminate fire ignitions that occur as a result of smoking material discarded into flower boxes. The research methodology used was descriptive.

Research questions included (a) what is the frequency and severity of flower box fires; (b) are there any commonalities in potting soils used, building construction, or occupancy; (c) what is the occurrence of cigarettes being disposed of in flower boxes; (d) what are the demographics of the people disposing their cigarettes in flower boxes; and (e) what environmental conditions exist which effect the probability of ignition and/or fire spread in flower pots.

The procedures used for this descriptive research include (a) reviewing incident reports from flower box fires, (b) perform in-person interviews of a sample of smokers living in the Anchorage area to ascertain specific attitudes and behaviors, and (c) observation of specified external environmental characteristics of residential buildings.

For the period January 1, 2005 to June 1, 2009, the Anchorage Fire Department responded to 28 fires, which were the result of smoking materials disposed into flower pots. Of 70 in-person interviews, 27% reported they had disposed of smoking materials into flower boxes in the past. None considered it a currently acceptable practice.

Recommendations include monitoring smoking material fires that involve building exteriors, incorporate the United States Fire Administration's Smoking and Home Fires

campaign into the fire departments local fire prevention campaign, and to develop a best practice for smoking rules at multi-family apartment buildings.

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## Building fires as a result of smoking materials disposed in flower boxes

### Introduction

Smoking remains a pastime that many Americans enjoy, though the increasing intolerance for second hand smoke has caused many communities to adopt no smoking bans in public places. Extending this principle even further, many homeowners are also enforcing such standards in personal residences, forcing family members and guests to smoke outside. As a consequence, smokers may be disposing of their smoking materials in whatever container they find readily available when going outside to enjoy their smoke.

The problem is smoking materials are being discarded into flower boxes, which has caused building fires. Many structures have suffered significant damage. The community of Anchorage has experienced several fires of this type within the last five years. Based on searches of daily newspapers and fire department press releases, fires of this type are being reported throughout the United States.

The purpose of this research was to ascertain the magnitude of the problem and to identify the variables that may be controlled or altered in an effort to reduce or eliminate fire ignitions that occur as a result of smoking material discarded into flower boxes. The scope of this research included identifying human behaviors which cause people to improperly discard their smoking materials into flower boxes and to identify environmental characteristics which may propagate the ignition and/or spread of fire in these circumstances. The research has been limited to buildings found in Anchorage, Alaska and included flower boxes located on or adjacent to building exteriors. Excluded from this research was any experimental type evaluation; specifically the evaluation of ignition probability based on cigarette disposal methods under varying soil and weather conditions.

The research methodology used was descriptive, which includes identifying and reporting the current condition of the problem (United States Fire Administration [USFA] Executive Fire Officer Program, 2008, p. II-17). The output of this effort includes recommendations designed to reduce the improper disposal of smoking materials into flower pots.

Through this research, risk prevention measures may be identified that could prevent the incident from occurring in the first place. Or through risk mitigation analysis, a variety of means may be found that reduce the effects of these fires. (USFA Executive Analysis of Community Risk Reduction, 2008, pg 1-13). As such, this research is directly related to the course Executive Analysis of Community Risk Reduction.

This research topic may also make contributions to attainment of the USFA's operational objectives including "reducing the loss of life from fire..." (USFA Executive Fire Officer Program, 2008, p. II-2), but the USFA objectives specifically state reducing loss of life in the "age group 14 years old and below" and "age group 65 years old and above". It is uncertain how this research will impact these groups. There may also be positive impact in "reducing the loss of life from fire of firefighters" if these types of fires are reduced.

Research questions included (a) what is the frequency and severity of flower box fires; (b) are there any commonalities in potting soils used, building construction, or occupancy related to these fires; (c) what is the occurrence of cigarettes being disposed of in flower boxes; (d) what are the demographics of the people disposing their cigarettes in flower boxes; and (e) what environmental conditions exist which effect the probability of ignition and/or fire spread in flower pots.

## Background and Significance

According to the United States Fire Administration, smoking remains the number one cause of home fire deaths in the United States (2007). Considering this fact, by applying the Pareto principle, whereby the greatest contributor to a problem is tackled first, there is an increased probability that an improved outcome will be achieved; in this case reducing fire deaths and/or minimizing property damage. Considering that smoking is the leading cause of fire deaths, continued research in this area could yield significant new discoveries or expose deficiencies in current theories regarding this topic. Hall states, “Realistically, any efforts to reduce the fire deaths in this country must address the smoking-material fire problem” (2007, p. i).

An initial review suggests that flower pot fires are rare and when they do occur they are minor in nature. This is illustrated by a statement made in a Consumer Reports posting where it was reported, “Fire prevention advocates and gardening experts, however, say the chances of such fires are extremely low. The National Fire Protection Association (NFPA), a non-profit group that keeps detailed data on such fires, said it has no reports of fire caused by flaming flower pots” (Perton, 2006). Recent searches of the NFPA’s and the USFA’s websites reveals no specific alerts regarding building fires caused by improper disposal of smoking materials into flower boxes.

As previously mentioned, searches of daily newspapers and fire department press releases indicate these types of fires are occurring throughout the United States. The NFPA reported in March/April 2009 a fast moving fire which destroyed a modular home in Massachusetts (Tremblay). The cause was a cigarette discarded into a planter box and the loss was estimated at \$500,000. The San Juan Fire Department, New Mexico, reported on its website that they



investigated four fires within a one year time period and they all appeared to have started in the immediate area of flower pots (n.d.).

Further, the Spokane Fire Department, Washington, reported in July of 2007 a building fire where the cause was identified as a cigarette in a flower pot. In this case the building was a multi-resident apartment building and the apartment of origin was destroyed. The fire started on an exterior porch and ignited a nearby barbecue, which exploded. The Anchorage Fire Department, Alaska, has also responded to fires of this type including a relatively minor incident in 2008, where damage was limited to a melted planter box and a hole in the front deck. Damages were estimated at \$1000.

Finally, in the most extreme of examples, Billings, Montana reported in 2008, “A person was killed in a home fire started when cigarettes in a flower pot ignited dry potting soil and sparked the blaze” (USFA, QR Summary, 2008)

These sources suggest that fires do start as a result of smoking materials discarded into flower boxes, though the magnitude of the problem has yet to be determined. The consequences range from minor to severe, with relatively small fires to homes totally destroyed to at least one fire fatality. There is also an apparent increase in danger to firefighters, particularly when propane bottles explode. As such, there appears to be sufficient initial evidence to support the contributions this research may make in reducing fire deaths and/or decreasing property damage as a result of smoking materials disposed into flower boxes.

### Literature Review

For a building to be ignited as a result of smoking material discarded into a flower box a chain of events must occur; Executive Analysis of Community Risk Reduction refers to this as risk sequencing (2008, p.1-13). The sequence of events include a compelling need to smoke

outdoors, an ignition source (smoking material), a container which holds potting soil or similar mixture, and the physical placement of the smoking material into the flower pot. A survey of available literature reveals only one article devoted to this specific topic; an article from a quarterly periodical where ignition probability was evaluated when smoking material was disposed of into flower boxes. In an effort to increase findings, the search was broadened to include any literature related to any one of the four individual events required for ignition to occur. The findings have been summarized in the following four categories; smoking outdoors, flower/potting soils, environmental considerations and smoking material and their disposal.

### *Smoking outdoors*

As a result of increased anti-smoking campaigns, cigarette smoking has significantly declined in the last 40 years (Centers for Disease Control and Prevention [CDC], 2008, p.1221), but smoking still remains an activity of choice for many Americans. The CDC reported in 2006 that 20.9% of the American population, or approximately 44.5 million people, aged 18 years and older reported smoking at least 100 cigarettes in his or her lifetime and who currently smoke every day or some days (p.25). Alaska ranks number eight with 24.9% of its states population reporting themselves as smokers, which is approximately 112,000 smokers (CDC, 2006, p.10). These figures illustrate an ever increasing gap between smokers and non-smokers, which appears to be causing the passage of legislation by many communities to ban smoking in certain public places.

As of 2009, there are a total of 3010 municipalities in the United States that have local laws in effect that restrict where smoking is allowed. In addition, 37 states and the District of Colombia have local laws in effect that require 100% smoke free workplaces and/or restaurants and/or bars (American Nonsmokers Rights Foundation, 2009). The Municipality of Anchorage

adopted a clean air ordinance, which went into effect July 1, 2007 and prohibits smoking in workplaces, restaurants and bars.

While legislation exists that bans smoking in workplaces, restaurants and bars, no local or state legislation has been passed banning smoking in single, family residences. The most restrictive legislation to date was passed in the City of Belmont, California, where smoking is prohibited in individual units, and their patio/yard areas, of multi-unit/multi-story residences that share common floors and/or ceilings with at least one other such unit (City of Belmont, 2008).

Despite the absence of legislation banning smoking in residences, many families are voluntarily adopting smoke-free policies in their homes. The CDC estimated that “the national prevalence of households with smoke-free home rules in the United States increased significantly, from 43.2% during 1992-1993 to 72% in 2003” (2007, p.501). For 2003, Alaska ranks fourteen with 75.8% of the population reporting smoke-free rules in the home (CDC, 2007, p.504).

In regards to second hand smoke, as the public becomes more aware of the negative health effects and are increasingly educated about the dangers of incidental exposure, more and more Americans will choose to institute personal policies demanding that smokers find new locations to smoke outside of their homes. The CDC states:

Because smoke-free home rules are voluntary, they are important indicators of changes in public awareness of the health effects of second-hand smoke and in public attitudes regarding the social acceptability of smoking. They also reflect personal concerns about protecting family members. In particular, the large increase in smoke-free home rules that has occurred in households with smokers during the past 10 years suggests a considerable shift in social norms (2007, p.502).

National efforts are also underway which seek and encourage smoke-free homes, particularly homes with children. The United State's Environmental Protection Agency and the Department of Health and Human Services have partnered in an effort to conduct nationwide second-hand smoke and asthma outreach. Smoke Free Homes is also a national effort to train pediatric clinicians in brief, effective methods to reduce children's secondhand smoke exposure.

The USFA has performed comprehensive analysis of the smoking problem, as it relates to fire ignitions and the high number of related fatalities, and has published many reports on this topic. Specifically, the USFA, in partnership with the NFPA, performed research of the behaviors which cause smoking fire fatalities and developed recommendations for behavioral mitigation strategies to reduce smoking fire fatalities in the United States (2006, p.i). This report recommended the use of four general messages which included as the number one message, "If you smoke, smoke outside" (USFA, 2006, p.15). This key message was derived from the following:

There is some indirect evidence of the relative safety of smoking outdoors. In 1994 to 1998, in the winter months of December through February, the rate of deaths per 100 reported smoking-material home structure fires was much higher-4.9% in December through February and 2.8 in the other months, or 75 percent higher in winter (2006, p.15).

Further, Hall has also identified that a substantial share (24%) of home smoking-material fires are ignited in outside locations, though only 2% account for associated fire deaths. "This is not surprising because outside locations have barriers separating them from the rest of the home, thereby preventing the easy spread of fire and fire effects to endanger the occupants" (2007, p.4). These facts support the theory that fires ignited on the exterior of buildings pose less threat than fires which start in the interior.

Between the national efforts of public health officials to reduce second-hand smoke exposure and the recommendation by fire service organizations to smoke outside, the literature supports the conclusion that a compelling need exists for many of America's smokers to take the activity outside.

### *Flower/potting soils*

According to R.C. LaGasse, Executive Director of the Mulch and Soil Council, the material used in the production of flower and potting soils varies, though most soils are generally organic in nature and contain a mixture of bark particles, peat moss, perlite and vermiculite. Also used as a substitute are over-products of mulch production which include leaves and grass clippings. Potting soils typically have moisture content between 45% and 55% when in packaging. (personal communication, June 4, 2009).

The most comprehensive literature on this specific topic is the result of testing conducted by D.A. Schuh and J.L. Sanderson, in which they evaluated the probability of ignition when cigarettes were placed into containers of potting soil. The components of dirt and potting soil are compared and they state that potting soil is different from dirt in that dirt "consists of particles of gravel, silt and clay along with other mostly broken-down organic materials, such as decomposing plants and even animals," while potting soils contain compost, bark, peat moss and fillers like vermiculite and perlite. They state the fillers are fully oxidized and non-flammable, while the remaining materials (forest products) are combustible. Of interest, the fillers provide the ability for water and oxygen to reach the plant root system, but this characteristic might also propagate ignition by providing aeration through the potting soil (2009, p.1-3).

*Environmental Considerations*

Schuh and Sanderson were able to ignite potting soil, though only after it had been dried; it was determined soil directly from the package was too moist to ignite. To simulate drying conditions, the soil was placed into ovens at 200 degree Fahrenheit for two hours. They report that “all varieties of the oven-dried potting soil began smoldering within minutes of placing the cigarettes on top of the soil”. They also found that air movement shortened the time that flames grew visible, though wind was not necessary to actually incur visible flames (2009, p.1-3). LaGasse inferred that fires occur when plants are dead and not cared for (personal communication, June 4, 2009).

The flower pot itself must be in a convenient and readily accessible location to the smoker who has gone outside. Schuh and Sanderson claim that “plant containers are usually located on decks, porches, or inside homes” (2009, p.3). Incident information from several press releases support the claim that flower pots are kept on front and back porches, as described “...in a flower box on the front porch” (Tremblay, 2009). Further, these same sources describe similar fire conditions among the sample incidents, where the fire ignites the porch and/or siding and then spreads vertically into the attic area.

Porches also serve as popular locations to store and use barbecue grills, including those that use propane. As described earlier, during one incident of this type, a fire that started in a planter box spread to a nearby propane tank causing an explosion (Spokane Fire Department, 2007). Further, there are similarities between barbecue fires and planter box fires in that both types of fires start on exterior porches and then the fire spreads vertically from the exterior siding into the attic area. In the case of barbecues, many jurisdictions, including the Municipality of

Anchorage, have opted to institute bans prohibiting the use of barbecue grills on the porches of multifamily dwellings.

Considering the exterior nature of these types of fires, it should be anticipated that smoke detectors may be ineffective in providing early notification to occupants. In the case of the home totally destroyed in Massachusetts, the press release stated the family escaped before the smoke alarms were activated. The home was reported to have had seven smoke detectors. A neighbor heard the fire and rushed to wake the residents (Tremblay, 2009).

Environmental factors play a key role in the chain of events required for flower pots to ignite. The soil must be dry and wind may intensify the speed by which the fire grows and spreads. The location of the flower pots also contributes to both the ignition and spread. Many flower pots are kept on combustible surfaces and adjacent to exterior siding, providing a vertical surface for fire spread. Propane bottles may also be stored in close proximity, increasing the risk to both firefighters and civilians alike. Smoke detectors are also less effective considering these types of fires start on the exterior and then spread to the interior.

#### *Smoking Materials and their disposal*

People are either unaware of potentially adverse risk outcomes or they choose to take the risk, even though they may be fully aware of the potential consequences. In either case, accidents, or preventable incidents, do occur resulting in injuries, deaths and property loss. In the case of smoking material fires, “all that can be said is that most fires are attributed to some error in control or disposal” (Hall, 2007, p.2). For whatever reasons, many smokers fail to either properly control or extinguish his or her cigarettes.

In the case of flower pot fires, evidence suggests that some smokers are unaware that potting soil is combustible and should not be used for smoking material extinguishment. Some

smokers even consider the potting soil an equivalent to non-combustible dirt. The City of Burlington, Ontario reports “although the resident had shown correct intentions to dispose of the cigarette in a safe manner, they were unaware that the potting soil mixture contained peat moss, which can be easily ignited and will smolder for prolonged periods of time” (Burlington Fire Department, n.d.).

The combination of flower pots being placed near where smokers congregate and the misconception that the pots are filled with “dirt” provide sufficient opportunity for smoking materials to be discarded into them. But as previously discussed, dirt and potting soil are not the same material and the convenience of flower box locations may be facilitating the improper disposal of smoking materials (Schuh and Sanderson, 2009).

Considering the contribution that improper control and disposal of cigarettes makes on the smoking material fire problem, the number two and three general messages from the USFA are:

Whenever you smoke, use deep, sturdy ashtrays. Ashtrays should be set on something sturdy and hard to ignite, like an end table;

Before you throw out butts and ashes, make sure they are out, and dowsing in water or sand is the best way to do that (USFA, 2006, p.ii).

These points illustrate the importance of ensuring the disposal container is safe and designed for the intended use, and that extinguishment should use water and/or sand. In the case of flower pots, neither the container nor the potting soil inside is designed or intended to be used as an ashtray or a medium for extinguishment.

While many localities have instituted smoke-free ordinances, most don’t involve any controls at residential properties, though the City of Belmont, California’s ordinance permits



landlords to designate outdoor smoking areas if they are more than 20 feet from any operable doors or windows used by the public (City of Belmont, 2008). Another emerging practice is for property owners/landlords to simply prohibit smoking in both indoor and outdoor areas. Within the Municipality of Anchorage, many apartment and multifamily buildings have adopted such policies (S. Scott, personal communication, June 9, 2009). While policies like these provide separation from second hand smoke, they also benefit by reducing the opportunity for smokers to dispose of their cigarettes into improper containers stored near building exteriors.

Finally, the introduction of fire-safe cigarettes may be the most significant initiative today in the effort to curb smoking material fires. Fire-safe cigarettes are designed to “reduce the propensity to burn when left unattended” (Coalition for Fire Safe Cigarettes, 2009). Twenty three states, plus the District of Columbia, have implemented safe cigarette laws. Another 23 states have passed legislation which will go into effect in the future. Alaska adopted such legislation, which went into effect on August 1<sup>st</sup>, 2008.

In conclusion, the negative health effects of second-hand smoke have caused an increasing number of smokers to take this activity outside. As a result, flower boxes that are conveniently located near entrances where smokers congregate have become convenient targets for disposal of smoking materials. When sufficiently dried, potting soil is combustible; some smokers are unaware of this characteristic. Many initiatives are underway to reduce the effects of smoking-material fires though fire-safe cigarettes may offer the greatest return.

### Procedures

The procedures used for this descriptive research include (a) reviewing incident reports from flower box fires to ascertain the frequency and severity and to correlate any common characteristics, (b) perform in-person interviews of a representative sample of smokers living in

the Anchorage area to ascertain specific attitudes and behaviors regarding disposal of smoking material into flower boxes, and (c) observation of specified external environmental characteristics of residential buildings including whether flower pots are present and the physical locations in which they are kept.

### *Incident Report Review*

Incident reports have been acquired from the Anchorage Fire Department (AFD) for all incidents for the period January 1, 2005 through June 1, 2009. Incidents of interest include those where the incident type was reported to be in category 100-Fire and the Fire module was completed. Exposure fires have been omitted. From these records, the data set will be further narrowed by selecting those where the heat source was reported as cigarette, pipe, cigar, or undetermined smoking material.

Incident reports also contain the item first ignited and the type of material it was constructed from, though the choices are very generic and do not include a choice that is specific enough to ensure the selection of reports where a flower box was involved in the ignition. As such, each incident report narrative was reviewed to properly categorize these fires as either flower pot fires or to exclude them as irrelevant.

A free-text query was also completed of the data set to identify any fires that may have been miscoded. The free-text search term used was flower.

Using geographical information system software, all flower pot fires found will be mapped and compared to two common socioeconomic indicators, median income and population density.

The AFD is a compliant participant in the National Fire Incident Reporting System (NFIRS).

### *Survey of Smokers*

In-person interviews of a representative sample of smokers living in the Anchorage area was performed to ascertain specific attitudes and behaviors regarding disposal of smoking material into flower boxes. The chain of events that leads to ignition of a flower pot by discarded smoking material is directly linked to people who use smoking materials. Considering the intimate need for a smoker to discard the material, the target population for this survey was active smokers.

Using available census data, a sampling frame was identified. According to the United States Census Bureau, the 2007 population estimate for the Municipality of Anchorage is 279, 671. The CDC estimates the percentage of smokers in Alaska at 24.9% (CDC, 2006, p.10). Using this data, the number of smokers living in the Anchorage area is estimated at 69,638. With a margin of error of +/-10% and a confidence interval of 90%, the recommended sample size is 68.

The sample of residents was selected at random, and going door to door, they were requested to participate in this voluntary survey; only people who indicate they actively smoke were interviewed. The survey inquires whether they have flower boxes outside their homes and whether cigarettes are discarded into the flower boxes. Also collected were the age, sex, and race/ethnicity of the respondent. All responses are confidential and the respondents remain anonymous. The complete survey is included in Appendix A.

### *Observations of External Environmental Characteristics*

Observations of external environmental characteristics of residential buildings were performed to evaluate whether flower pots are present and to identify the locations in which they are kept. The target population is any housing unit within the Municipality of Anchorage.

According to the United States Census Bureau, the 2007 estimate for the number of housing units in the Municipality of Anchorage is 110,164. With a margin of error of +/-5% and a confidence interval of 99%, the recommended sample size is 660 housing units.

Three neighborhoods in the Municipality of Anchorage were randomly selected including one low income (less than \$50,000 median income), one middle income (between \$50,000 and \$70,000 median income) and one high income (greater than \$70,000 median income). These observations were performed by driving the neighborhoods and observing the presence of flower boxes, estimating the proximity of these flower pots to the building and identifying exterior features.

A housing unit would be counted if at least one flower box was observed adjacent to the building. Flower boxes could be constructed of ceramic, wood or plastic. No contact was made with the residents. Limitations include the inability to observe all sides of the building, which may conceal the presence of flower boxes near and/or around entrances and porches not visible from the street.

### Results

For the period January 1, 2005 to June 1, 2009, the AFD reported 2032 fires, where the NFIRS Fire module was completed. There were many more fires, like *154-Dumpster or other outside trash receptacle fire*, where the Fire module was not required to be completed; these were omitted from the count. Of the 2032 incidents, 85 of these indicated *61-cigarette* or *63-heat from undetermined smoking material* as their heat source. Of these 85 incidents, 14 were the result of smoking materials disposed of into a flower pot.

Another five incidents were located where the heat source was not listed as *61-cigarette* or *63-heat from undetermined smoking material*, but on further examination of the incident

narrative it was determined these fires were the cause of smoking materials disposed of into flower boxes. These reports listed the heat source as *UU-Undetermined* for three of the incidents, *40-Hot or smoldering object, other* for one, and *43-Hot ember or ash* was assigned to the last.

Further, based on the free-text search of incident narratives, nine additional fires were located that were the result of smoking materials being disposed of into flower boxes. The Fire module was not completed for these incidents because the incident type selected did not require its completion. The incident type selected for these are summarized in table 1.

Table 1-Incident type for flower box fires, no Fire module

Trash or rubbish fire, contained	4
Grass fire	1
Invalid Fire Code - Do not use	1
Natural vegetation fire, other	1
Outside rubbish fire, other	1
Special outside fire, other	1
<b>Total</b>	<b>9</b>

With the results of these searches combined, the total number of fires where smoking material were involved in the ignition was 99. Of these, 28 were the result of smoking materials disposed of into flower pots. These 28 fires accounted for an estimated \$1,048,917 in property and content losses. Thirteen of the 28 incidents reported losses of \$10 or less. The average loss for all 28 incidents is \$37,461. The largest loss was \$370,000. Of the 28 incidents only one had reported injuries; two firefighters and one civilian sustained minor injuries. Appendix B contains the summary list of the 28 fires which were the result of smoking materials discarded into flower pots. Appendix C is a map of Anchorage indicating the location of each flower pot fire and the median incomes and population density by census tract (United States Census Bureau, 1999).

Figure 1 illustrates the number of smoking material fires that ignited as the result of flower box ignitions compared to other smoking material fires. Of the 99 smoking material fires, 28% or 28 were the result of disposal into flower boxes. 2009 data is only for the first five months of the year.

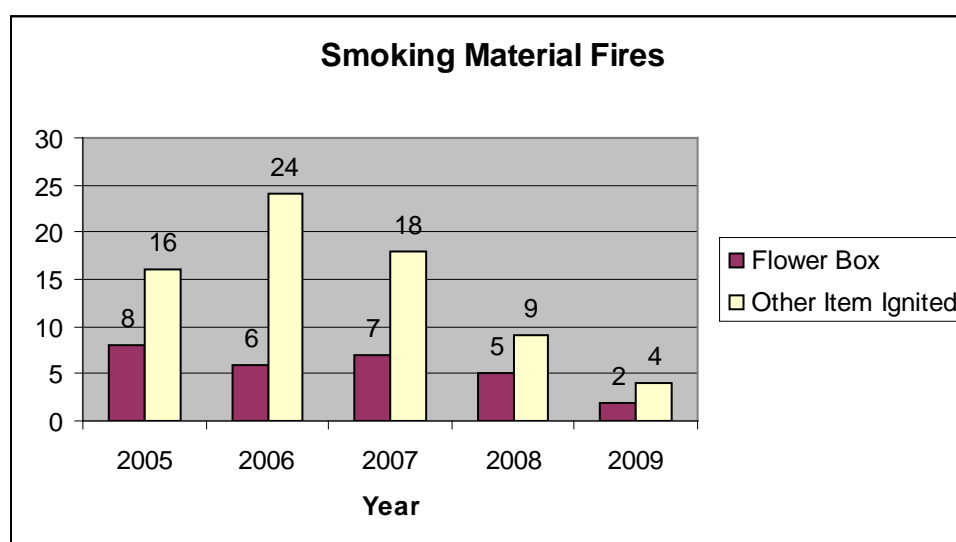


Figure 1-Smoking material ignitions compared by year and material ignited

The majority of these fires occurred in residential dwellings; 14 occurred in 1 or 2 family dwellings, 8 occurred in multifamily dwellings, and the other 6 occurred in a variety of property types. Of interest, while multifamily dwellings accounted for 29% of the incidents, this category accounted for 74% of the total losses.

Table 2-Summary of property use by occurrences and losses

Property Use	Count	Losses	Percent of total losses
1 or 2 family dwellings	14	\$258,815	24.67%
Multifamily dwellings	8	\$780,102	74.37%
Bank	1	0	0.00%
Green Belt	1	0	0.00%
Schools	1	0	0.00%
Hotel/motel, commercial	1	0	0.00%
Residential board and care	1	\$10,000	0.95%
Specialty shop	1	0	0.00%
<b>Total</b>	<b>28</b>	<b>\$1,048,917</b>	<b>100.00%</b>

Of the 99 fires where smoking material was involved in the ignition, the area of origin was an exterior characteristic in 51 of the fires, accounting for 52% of the incidents. Table 3 summarizes this data. Those area of origins categorized as exterior are indicated by a double asterisk. The column labeled flower pot indicates the count of incidents for just flower pot type incidents; all of these occurred in exterior areas.

Table 3-Summary by area of origin

Area of Origin	<i>Flower Pot</i>	2005	2006	2007	2008	2009	Total
Exterior balcony, unenclosed porch**	6	2	5	5	5	1	<b>18</b>
Operator/passenger area of transportation		4	2	2	3		11
Bedroom - < 5 persons; included are jail		2	5	3			10
Courtyard, patio, porch, terrace**		2	3	3			<b>8</b>
Wall surface: exterior**	4	1	1	2	2		<b>6</b>
Vehicle storage area; garage, carport**	2	1	3	1		1	<b>6</b>
Exterior stairway, ramp, or fire escape**	3	2	1		1	1	<b>5</b>
Outside area, other**	1	1	2	1			<b>4</b>
Exterior, exposed surface**	2	2		1			<b>3</b>
Common room, den, family room		1	1			1	3
Entrance way, lobby	1		1			1	2
Egress/exit, other			1	1			2
Function area, other		1	1				2
Laundry area, wash house (laundry)			2				2
Bedroom - 5+ persons						1	1
Cargo/trunk area - all vehicles			1				1
Ceiling & floor assembly				1			1
Cooking area, kitchen					1		1
Fuel tank, fuel line		1					1
Interior stairway or ramp					1		1
Roof surface: exterior**				1			<b>1</b>
Sales area, showroom			1				1
Area of origin not recorded	9	4		4	1		9
<b>Total</b>	<b>28</b>	<b>24</b>	<b>30</b>	<b>25</b>	<b>14</b>	<b>6</b>	<b>99</b>

The time of day and the time of year were evaluated in regards to when the ignitions occurred. The number of ignitions, by time of day, ranged from zero to three, with 10:00am and 6:00pm being the most common hour for ignition, as illustrated in figure 2. Figure 3 summarizes

the number of ignitions by month; there is an apparent peak in the summer months of May, June and July.

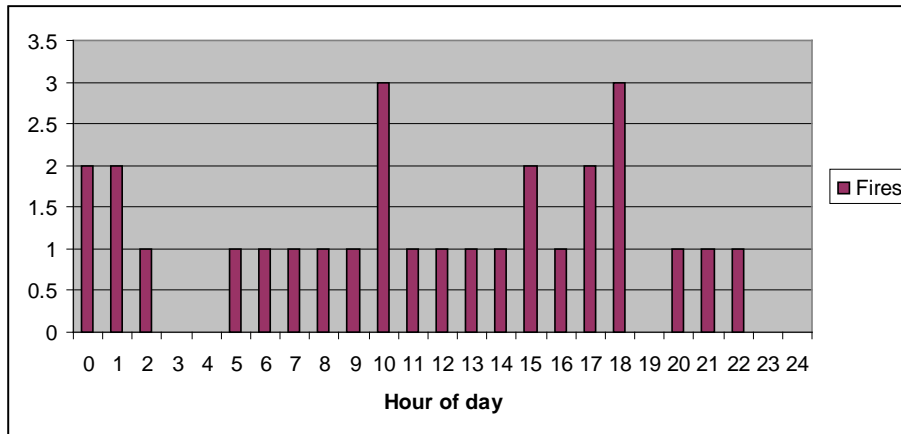


Figure 2-Number of smoking material fires by time of day

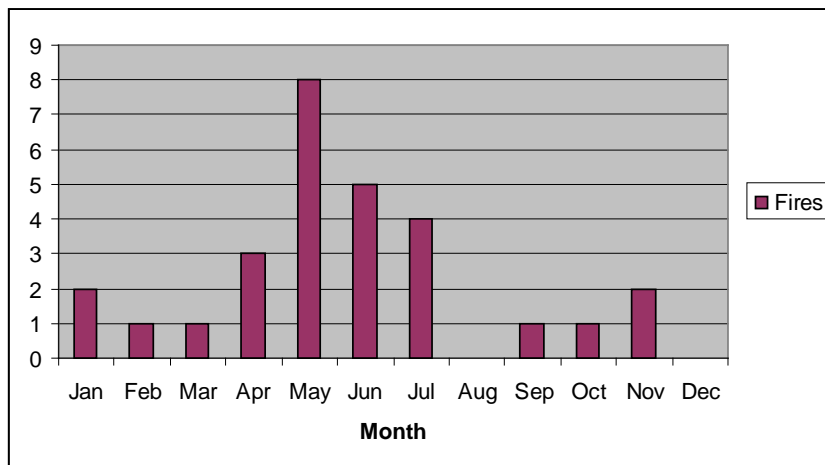


Figure 3-Number of smoking material fires by month

In regards to the materials that flower boxes are constructed from, five were constructed of plastic and three were made out of wood. Text included “planter box constructed of old dry wood and secured to a handrail also made up of old dry wood”. The remaining 20 incident reports did not report the material the flower boxes were constructed from.

As for smoke detector operation, seven reports indicated the detector alerted the occupants, nine did not alert occupants, seven buildings were unoccupied, and one was



unknown. Four of the incidents had incident types that did not require completion of smoke detector operation. The narrative of one report stated “they felt lucky because the neighbor noticed the fire”.

Using the survey from appendix A, 70 in-person interviews were conducted with smokers living in the Anchorage area. Demographics were:

Age		Sex		Race/Ethnicity	
Under 19	1	Male	31	Hispanic or Latino	4
19-35	30	Female	39	Native Hawaiian or other Pacific Islander	2
36-50	20			White	40
Over 50	19			Black or African American	8
				American Indian or Alaska native	10
				Asian	3
				Other, includes multi-racial	3

Forty-eight of the respondents (69%) reported that they have policies against smoking in the home. Of these, common locations to smoke were reported as outside of the front or back doors, away from the building, or in the yard. Common containers used to dispose of smoking materials into included bottles, bucket of water, planter filled with rocks, and the trash can; a coffee can was used by the majority of respondents.

Thirty-eight of the respondents (55%) reported having flower boxes outside of their homes. Of the 70 respondents, 19 or 27% reported they had disposed of smoking materials into flower boxes in the past. None of the smokers considered it acceptable to dispose of smoking materials into flower boxes. During the door to door interviews, in only one instance was

discarded cigarettes observed inside a flower box; this one flower box was full of potting soil but did not contain any flowers.

Observations were made of building exteriors to ascertain the prevalence of flower boxes. The low income neighborhood accounted for 282 buildings; of these, 78 or 28% had flower boxes visible from the exterior. Of the 343 homes observed in the middle income neighborhood, 102 or 30%, had flower boxes. The high income neighborhood had 100 homes, out of 261 (38%), where flower boxes were visible. Of the flower boxes observed, more than 80% contained visibly cared-for, fresh flowers. Flower box construction was equally distributed among the three types; wood, plastic, and ceramic. The location of the flower boxes were on porches and driveways, pushed up directly against the buildings. In many cases, particularly in multiple family apartment buildings, flower boxes were set upon the tops of hand railings.

### Discussion

Considering the complex combination of circumstances necessary to ignite a flower pot with discarded smoking materials one might expect the probability to be relatively low. The sequence of events requires the existence of rules prohibiting smoking inside, the presence of a smoker, a readily available flower box and finally the disposal of the smoking material into the box. With 28 fires over a period of four and a half years in Anchorage, the evidence supports the conclusion that smoking materials are discarded into flower boxes and that they do ignite fires. What has not been clearly established is how many times cigarettes have been disposed and fires have not started. This research indicates that very few cigarettes are actually disposed of into flower boxes, therefore an early conclusion is few cigarettes are disposed of into flower boxes, but when they are there is an increased likelihood of ignition.

Also increasing the complexity is the need for the soil to be dry. Based on the experiments conducted by Schuh and Sanderson, the soil will only ignite under ideal circumstances. The potting soil must be sufficiently dried to become combustible; soil that is new and out of the bag or regularly cared for appears to contain too much moisture to ignite. Therefore, in addition to the sequence of events already established, an additional characteristic is dried soil.

Considering these incidents from a risk assessment perspective the frequency of these events remains relatively low, when compared to all fires, averaging only 6.5 fires a year. When compared to other smoking material fires though, they account for 28% of the ignitions, which represents a significant portion of the total.

As for the severity of these incidents the outcome is generally relatively minor, as evidenced by Anchorage data, with nearly 50% of the incidents reporting losses of \$10 or less. Considering the exterior nature of these fires, exterior walls serve as excellent barriers to separate the fire from occupants on the inside of the building. Further, during waking hours, typically these fires are easily observed by passers-by and the fires are extinguished while they are still small.

Conversely, the outcome can also be severe, as illustrated by the \$370,000 loss in Anchorage. While the exterior nature of these fires can serve as a strength it can also act as a detriment. Fires that ignite on the exterior have the propensity to spread vertically up the siding and into the attic, resulting in a large, fast spreading fire. Attic fires can be difficult to access resulting in delayed extinguishment. Fires that start on the exterior can also be affected by wind, which increases the rate of spread. If the fire starts during sleeping hours there is also an

increased likelihood passers-by will not be present to notice the fire. Smoke detectors will only activate once the fire has spread to the interior, at which point the fire has grown substantially.

Also of notable interest, while only 29% of these fires occurred in multi-family buildings, their losses accounted for more than 74% of the total. This appears to be the result of several factors including the size and accessibility of the building. When fires start on the exterior of multifamily buildings, there is considerably more exterior surface area for the fire to spread. The fire also has the opportunity to penetrate more living units, particularly when it starts on the first floor of a multi-story building. Accessibility into multi-family buildings is also more restricted including the limited parking for fire apparatus and the increased time it takes to traverse multi-floor buildings.

The geographical map of the flower pot incidents, in comparison with median income and population density, indicates a relatively proportional distribution of the incidents throughout Anchorage. An initial expectation was that more flower pot fires would have occurred in higher density neighborhoods where multi-family buildings are more prevalent, though these types of fires appear to occur in all areas from rural to metropolitan.

As the disproportion of non-smokers to smokers continues to increase, the number of acceptable indoor places to smoke will also decrease. Anchorage's data is similar with the national trend showing an ever increasing gap between homes that permit smoking and those that don't, with 69% of the survey respondents reporting they require smokers to go outside. As a result it should be anticipated that exterior fires started due to improperly disposed of smoking materials will increase. The results from the Anchorage data appear to support this conclusion, with 52% of the smoking material fires occurring in exterior areas.

While this research focused specifically on flower box fires, of greatest value may be the recognition that smokers are moving to the outdoors and exterior fires are on the rise. No matter the medium used for extinguishment, trash can, plastic bucket or planter box, when the wrong receptacle is used there is an increased probability for an exterior fire to start. Future research could be conducted on this issue alone.

Observations of residences revealed that many families indeed kept planter boxes near their homes, with approximately one-third having some sort of planter or flower box, but the vast majority of these flowers were green, alive and well-tended. It is possible the methodology was flawed, considering the observations were made at the beginning of the gardening season in Alaska, when it should be expected that flowers will be found to be in full bloom. Based on this assumption one might expect any increases in flower box fires to occur after the growing season, when flowers have perished and the soil has dried. These months are from September to March.

The Anchorage data reveals the exact opposite, the majority of fires occurred between April and July, with a significant spike during the month of May. May is the start of gardening season in Alaska, when flower pots should be in their freshest state and the probability for ignition is at its lowest. In any event, these results are consistent with the national results reported by Hall, where the increase in exterior smoking material fires occur in the summer months and decrease in the winter months, when people are more averse to going outdoors.

The in-person interviews disclosed that only a small portion (27%) of the respondents had ever disposed of cigarettes into flower boxes and even more surprising was the lack of admission by any of the respondents that they currently throw smoking materials into planters. It is possible that the respondents felt uncomfortable answering the question honestly and this may have been another unforeseen limitation of the survey style. Further, of those homes with

smokers and where flower pots were visible, only one flower pot was observed to have had smoking materials discarded into it.

Considering the relative similarities between barbecue fires and exterior smoking material fires there may be value in instituting similar controls to prevent the ignition of these types of fires. Like barbecues, it may be of value to restrict smoking to outdoor areas near large multi-family buildings. If this type of restriction was legislated, it may be met with considerable consternation on the part of the public. If so, a campaign targeting apartment building owners could be used to encourage the implementation of such restrictions at multi-family buildings. Many buildings already have such rules in place and this best practice could be endorsed and encouraged throughout the community.

Probably of greatest significance is the introduction of fire-safe cigarettes. With fire-safe cigarettes going on sale in Alaska in August of 2008, there should be a reasonable anticipation that there will be an observable decrease in smoking material fires in the foreseeable future. The Anchorage results include the second half of 2008 and the first half of 2009, and using this data, smoking material fires appear to be occurring at similar past rates. This may be attributed to regular cigarettes still in circulation. In any event, the frequency and severity of smoking material fires should be monitored to ascertain the effects.

The result of this research has generated new inquiries including variations on the sequence of events. What was not considered was the situation in which a smoker would visit a non-smokers house, be required to go outside and find a dry flower box. I believe this was an unforeseen combination of circumstances, which may warrant further research. The premise is that non-smoking households will have a higher rate of no smoking rules, and further, the non-smoking homes will be unaware of the associated risks and will not have readily available the

recommended container for smoking material disposal. As a consequence, the smoker will extinguish his or her cigarette in the most convenient container available which may be a trash can, plastic bucket or a flower box.

In conclusion, while smokers do not readily admit to disposing of their smoking materials into flower boxes and very few cigarettes were actually observed in boxes, these types of fires do occur. In Anchorage, these fires occur at a rate of five to eight per year, some causing significant damage and many more resulting in only minor damage. While the highest frequency of these fires occurs in single family homes, multi-family buildings account for the vast majority of losses. As the gap between smokers and non-smokers increase, smokers will continue to move to the outdoors, thereby increasing the likelihood of exterior building fires.

### Recommendations

As a result of this research, the following are recommended for adoption by the Anchorage Fire Department:

1. Monitor smoking material fires to include expanded details about the type of material that was involved in the ignition, the location of the ignition (exterior or interior), and the type of smoking material involved (was it a fire safe cigarette). If a flower box is the area of origin, what was the condition of the soil and what was the material the flower box was constructed from (plastic, wood, or ceramic).
2. Incorporate the United States Fire Administration's Smoking and Home Fires campaign into the fire departments local fire prevention campaign. Target audience should include the residents of multi-family apartment buildings.
3. Develop a best practice for smoking rules at multi-family apartment buildings and advocate for its voluntary adoption by building owners.

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## Appendix A-Survey Instrument

Do you smoke?

Yes No

Age	Sex	Race/ethnicity

Do you have a policy against smoking in your home?  
(no indicates smoking occurs in the home)

Yes No

If yes, where do you ask them to smoke? (specific location)

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If yes, where are the smoking materials disposed of?

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Do you keep flower boxes or planters outside your home?

Yes No

Have you ever disposed of smoking materials into flower boxes?

Yes No

Is it acceptable to dispose of smoking materials into flower boxes?

Yes No

What word or words best describe the materials which comprise planting soil?

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Building construction summary/other comments:

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## Appendix B-Flower pot fire detail

Date	Address	Loss	Incident Type	Property Use	Heat Source	Area of Origin	Item First Ignited
5/18/2009 10:29	6500-6640 E 12TH Ave	7500	Building fire	1/2FD	Cigarette	Entrance way, lobby	Box, carton, bag, basket, barrel
5/2/2009 15:20	235 Klevin St	10000	Building fire	RBC	Undetermined	Exterior balcony, unenclosed porch	Light vegetation - not crop, including grass
10/17/2008 0:45	1530 Cache Dr	4000	Building fire	1/2FD	Cigarette	Wall surface: exterior	Exterior wall covering or finish
9/15/2008 7:30	7070 CHERYL St	2000	Building fire	1/2FD	Cigarette	Exterior stairway, ramp	Light vegetation - not crop, including grass
7/2/2008 1:06	7141 Burlwood Dr	31000	Building fire	1/2FD	Cigarette	Exterior balcony, unenclosed porch	Organic materials, other
5/24/2008 6:41	2610 Bell Cir	3500	Building fire	1/2FD	Cigarette	Wall surface: exterior	Organic materials, other
2/1/2008 12:28	641 N Flower St	100	Trash, contained	MFD	blank	blank	blank
7/20/2007 13:53	9261 Commons Pl	5	Special outside fire	1/2FD	blank	blank	blank
6/16/2007 16:44	3500 EIDE St	0	Outside rubbish fire	Bank	blank	blank	blank
6/9/2007 9:58	9720 Vanguard Dr	370000	Building fire	MFD	Hot object	Exterior balcony, unenclosed porch	Exterior wall covering or finish
4/20/2007 5:27	18739 First St	5000	Building fire	1/2FD	Cigarette	Exterior, exposed surface	Organic materials, other
3/10/2007 8:02	2711 Valley Forge Cir	10	Trash, contained	1/2FD	blank	blank	blank
1/14/2007 20:40	905 Richardson Vista Rd	0	Trash, contained	MFD	blank	blank	blank
1/5/2007 21:41	9120 Dewberry St	2	Building fire	MFD	Undetermined	Vehicle storage area; garage	Organic materials, other
11/9/2006 10:21	100 MC CARREY St	55000	Building fire	1/2FD	Cigarette	Exterior balcony, unenclosed porch	Rubbish, trash, or waste
5/29/2006 18:30	7801 Schoon St	0	Building fire	Specialty	Cigarette	Wall surface: exterior	Exterior wall covering or finish
5/28/2006 0:44	10153 SALIX Cir	0	Building fire	1/2FD	Hot ember	Exterior balcony, unenclosed porch	Organic materials, other
5/2/2006 15:01	1916 Beaver Pl	0	Building fire	MFD	UDS	Exterior balcony, unenclosed porch	Structural member or framing
4/30/2006 2:01	531 E 16th Ave	0	Building fire	MFD	Cigarette	Exterior stairway, ramp	Box, carton, bag, basket, barrel
4/15/2006 14:57	8046 Wilcox St	500	Building fire	1/2FD	UDS	Outside area, other	Exterior wall covering or finish
11/21/2005 11:51	401 E 6TH Ave	0	Trash, contained	Hotel/motel	blank	blank	blank
7/25/2005 18:56	On W 3rd Ave at E St	0	Grass fire	Green Belt	blank	blank	blank
7/14/2005 18:43	2700 Merganser Ave	0	Fire, other	1/2FD	blank	blank	blank
6/28/2005 22:18	4121 Crannog St	300	Building fire	1/2FD	Cigarette	Wall surface: exterior	Organic materials, other
6/26/2005 17:00	13400 Elmore Rd	0	vegetation fire	Schools	blank	blank	blank
6/13/2005 1:35	4141 E 66th Ave	150000	Building fire	1/2FD	Undetermined	Vehicle storage area; garage	Exterior wall covering or finish
5/26/2005 10:23	2658 LEE St	160000	Building fire	MFD	Cigarette	Exterior stairway, ramp	Undetermined
5/9/2005 17:43	110 OKLAHOMA St	250000	Building fire	MFD	UDS	Exterior, exposed surface	Undetermined

Appendix C-Incident map of flower pot fires

